REMARKS

Conventionally, polycarbonate is produced in special manufacturing facilities where the resin is prepared and shipped, in a convenient form to the molders for shaping the resin into useful articles. Importantly then, the manufacturing facilities of polycarbonate are not integrated with the molding facilities and the polycarbonate is shipped to the molder in the form of solid pellets.

Accordingly the overall procedure for making products of injection molded polycarbonate entails first obtaining polycarbonate in molten state, extruding the molten polycarbonate to form a continuous strand of molten polycarbonate that is chopped, or pelletized to form particulates, known as pellets. This procedure is carried out in the plant where polycarbonate is produced.

The pellets are then typically transported to a separate facility where molding by injection molding takes place. The pellets are first heated to form a melt, the melt may be mixed with functional additives, for instance foaming agents, and the melt, or molten mixture, is then injected to a suitable cavity (a mold) for shaping into useful article. The conventional process is described in pages 194-195 (copy enclosed) of Chemistry and Physics of Polycarbonates by H. Schnell, InterScience Publishers, 1964. See especially the first full paragraph of page 195.

The inventive process concerns the making a shaped product from a thermoplastic polycarbonate. Unlike the conventional procedure, the polycarbonate is in its molten state introduced directly into an injection molding. The process is characterized in that the step of pelletizing the polycarbonate is avoided. By avoiding the re-melting of the resin, the molded articles exhibiting higher quality.

The claims stand rejected under 35 U.S.C. 102(b) said to be anticipated by U.S. Patent 5,308,558 to Woldenberg et al. ("Woldenberg").

In maintaining the rejection the Examiner is understood to argue that polycarbonate at room temperature does not exclude molten polycarbonate. Since room temperature is defined as 20 to 25°C (see the enclosed copy of page 756 of the Condensed Chemical Dictionary) the notion that polycarbonate may be in the molten state at this temperature is clearly erroneous - see the enclosed copy of page 194 of Schnell's book where the temperature range for processing is stated as 240 to 330°C.

Woldenberg relates to the use of a chemical agent for foaming thermoplastic aromatic polycarbonates.

There is nothing in the reference that describes or suggests introducing polycarbonate resin directly from its production into the injection molding machine, thereby avoiding the conventional pelletizing step. Attention in this connection is called to that the inventive mixture of polycarbonate, glass fibers and foaming agent is extruded - column 6, line 49 et seq. Previously produced polycarbonate is therefore introduced into an extruder where the mixture is subjected to a temperature of at least 270°C – column, 6 line 54 – where it is melted. The avoidance of pelletizing is neither described nor suggested.

Woldenberg conventional process cannot be seen as describing the present invention. Reconsideration of the application and retraction of the rejection are solicited.

Believing the above represent a complete response to the Office Action and that the application is in condition for allowance, applicants request the earliest issuance of an indication to this effect.

Respectfully submitted,

By ______________________

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CHEMISTRY AND PHYSICS OF POLYCARBONATES

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NEW YORK · LONDON · SYDNEY

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Stretched and crystallized fibers, as well as film stretched in two perpendicular directions and crystallized, are in the development stage.

2. INJECTION-MOLDED PARTS, EXTRUDED TUBES AND SHAPES, AND BLOW-MOLDED ARTICLES

A. Injection Molding

The largest portion by far of the commercially produced bisphenol A polycarbonate is converted into parts and finished products by thermoplastic processing methods (19–31). Thermoplastic processing of the material utilizes the conventional equipment of the plastics industry, such as injection-molding machines and extruders.

Molding grade bisphenol A polycarbonates have average molecular weights (calculated from solution viscosity) between 32,000 and 35,000. The melt viscosities of higher molecular products exceed the limits of economical processing methods.

The temperature range available for processing extends from 240 to 330°C. In this range the polycarbonate will not suffer any noticeable degradation so long as it contains less than approximately 0.01% moisture (section V, 4). Excessive moisture causes chemical degradation as melt temperatures are reached, with bubbles forming in the molten material. Additives such as lead or zinc silicates, organic tin compounds, aryl tin oxides (32), or tertiary esters of phosphorous acid with aromatic hydroxy compounds, such as tris-2-*tert.*-butyl-5-methyl-phenyl phosphite, have been suggested for stabilizing aromatic polycarbonates against degradation or discoloration at elevated temperatures (33).

The low moisture content necessary for thermoplastic processing is obtained by drying for about 8 hours at 120°C in a convection or vacuum oven. Since the dry polymer will rapidly absorb water from the air, it is recommended to keep it hot until it is transferred to the heated feed hopper of the processing unit.

Dry polycarbonate delivered in vacuum-tight containers is heated to about 110°C before breaking the seal in order to avoid moisture pick-up during handling and transfer.

Polycarbonate produced by the phosgenation process must be essentially free of chlorocarbonic acid ester groups. Methylene chloride used as a solvent also needs to have been removed down to very low residual values, since methylene chloride decomposes to form hydrochloric acid at the thermoplastic processing temperatures under the catalytic effect of metal surfaces. Hydrochloric acid resulting from the breakdown of

chlorocarbonic acid ester
corrosion of the processi
capable of changing the ch

In the form of largely ar
and subsequently cutting
essed on all commercial i
barrel temperatures of abo
tion by the pellets during th
is heated by means of radi
3000 watt/m² is usually suf

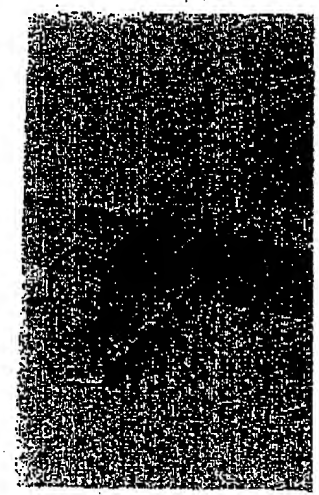

Fig. VI-1. Small components for

For larger parts screw-in
injection pressures, in the r
by the high-melt viscosity
open or the automatic sh
cylinder temperature.

Die designs must make a
carbonate by providing shor
runners as short as possible
Molds should be heated to ir

as film stretched in two
the development stage.

:UDED TUBES AND
ARTICLES

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form hydrochloric acid
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chlorocarbonic acid ester end groups and methylene chloride causes corrosion of the processing equipment and the molds and is further capable of changing the character of certain dyes and pigments.

In the form of largely amorphous pellets obtained by extruding strands and subsequently cutting them bisphenol A polycarbonate can be processed on all commercial injection-molding machines designed to attain barrel temperatures of about 350°C. In order to prevent moisture absorption by the pellets during their residence time in the feed hopper, the cover is heated by means of radiation equipment. A heating capacity of about 3000 watt/m^2 is usually sufficient.

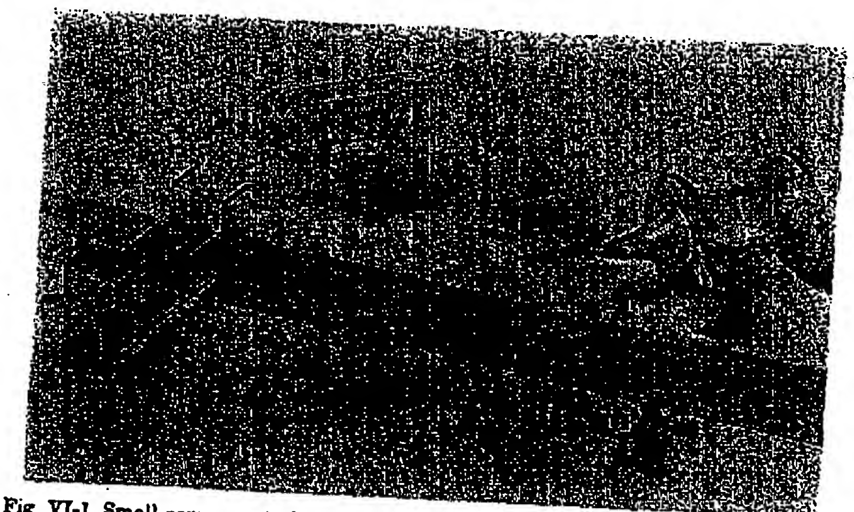

Fig. VI-1. Small components for the electrical industry injection-molded of bisphenol A polycarbonate.

For larger parts screw-injection-molding machines are required. High injection pressures, in the range of 700 to 2200 kg/cm^2, are necessitated by the high-melt viscosity of polycarbonate. Nozzles, whether of the open or the automatic shutoff type, must be heated, preferably to cylinder temperature.

Die designs must make allowance for the high-melt viscosity of polycarbonate by providing short sprues of ample cross-sectional area, making runners as short as possible, and keeping wall thickness above 0.7 mm. Molds should be heated to improve mold flow and reduce internal stresses

The Condensed Chemical Dictionary

NINTH EDITION

Revised by

GESSNER G. HAWLEY
Coeditor, Encyclopedia of Chemistry
Coauthor, Glossary of Chemical Terms

VNR VAN NOSTRAND REINHOLD COMPANY
NEW YORK CINCINNATI ATLANTA DALLAS SAN FRANCISCO
LONDON TORONTO MELBOURNE

"Rodine."[342] Trademark for red squill liquid extract rodenticides.

"Rodo."[69] Trademark for a series of blended essential oils used to deodorize rubber.

Roentgen, W. K. (1845–1923). German physicist who discovered x-rays in 1895 for which he was awarded the Nobel Prize in 1901. Application of these to a number of important problems in analytical chemistry was developed by the Braggs, Moseley, von Laue, and Debye and Sherrer.

roentgen (r). The international unit of quantity or dose for both x-rays and gamma rays. It is defined as the quantity of x- or gamma rays which will produce as a result of ionization one electrostatic unit of electricity of either sign in 1 cc (0.001293 g) of dry air as measured at 0°C and standard atmospheric pressure. The use of the roentgen unit has been extended to include particle radiation such as alpha and beta particles and protons and neutrons. See also rad, curie.

Rohrbach solution.
Properties: Clear, yellow liquid. Very refractive; sp. gr. 3.5.
Derivation: An aqueous solution of mercuric barium iodide.
Hazard: Highly toxic by ingestion and inhalation.
Uses: Separating minerals by their specific gravity; microchemical detection of alkaloids.

"Romark."[440] Trademark for alkyd and chlorinated rubber type road-marking paints.

ronnel. Generic name for O,O-dimethyl O-(2,4,5 trichlorophenyl) phosphorothioate, $(CH_3O)_2P(S)OC_6H_2Cl_3$.
Properties: Powder or granules; m.p. 41°C. Insoluble in water; soluble in most organic solvents.
Hazard: Toxic by ingestion and inhalation. Tolerance, 10 mg per cubic meter of air. Cholinesterase inhibitor. Use may be restricted.
Use: Pesticide.
Shipping regulations: (Rail, Air) Organic phosphate, solid, n.o.s., Poison label. Not accepted on passenger planes.

"Ronopole" Oil.[145] Trademark for highly oxidized sulfonated castor oil.

room temperature. An interior temperature from 20 to 25°C (68 to 77°F).

"Roracyl."[20] Trademark for a group of soluble dyes that have good affinity and fastness properties on leather.

"Rosaldehyde."[188] Trademark for a synthetic floral perfume base.

rosaniline $HOC(C_6H_4NH_2)_2C_6H_3(CH_3)NH_2$. A triphenylmethane dye.
Properties: Reddish brown crystals; m.p. 186°C (dec). Soluble in acids and alcohol; slightly soluble in water.
Hazard: May be toxic.
Uses: Dye (usually as the hydrochloride); fungicide.

"Rosanlith."[100] Trademark for a synthetic replacement of otto of rose.

roscoelite $K_2V_4Al_2Si_6O_{20}(OH)_4$. A vanadium-bearing species of mica (q.v.). Formula variable, with V_2O_3 up to 28%. Occurs as minute scales with micaceous cleavage; dark green to brown in color, pearly luster. Mohs hardness 2.5; sp. gr. 3.0.
Occurrence: Colorado, California, Australia.
Use: Source of vanadium.

rose absolute. Pure oil of rose. The first filtrate obtained on separation of waxes from the cooled alcohol solution of rose concrete in perfume manufacture.

rose concrete. Semisolid residue, a mixture of essential oils and waxes, resulting from extraction of rose flower petals, leaves, seeds, fruit, roots, gums or bark by means of a volatile solvent.

rose oil (otto of rose oil; attar of roses; rose flower oil)
Properties: Pale yellow, pale green, or pale red, transparent, essential oil; mild, sweet taste; strong, fragrant odor; semi-solid at room temperature. Sp. gr. 0.845–0.865; solidifying point 18–37°C; saponification value 10–17; acid value 0.5–3; refractive index (n 30/D) 1.457–1.463. Combustible; nontoxic.
Chief constituents: Geraniol, citronellol and phenylethyl alcohol.
Derivation: By steam distillation of the fresh flowers of Rosa damascena, Rosa centifolia, Rosa galica and Rosa alba.
Grades: Bulgarian; French; Turkish; N.F.; F.C.C.
Uses: Perfumes; flavoring.

"Rosetone."[19] Trademark for trichloromethylphenylcarbinyl acetate (q.v.).

rosewood oil. See oil bois de rose.

rosin
Properties: Angular, translucent, amber-colored fragments; sp. gr. 1.08; m.p. 100–150°C; acid no. not less than 150. Flash point 370°F. Insoluble in water; freely soluble in alcohol, benzene, ether, glacial acetic acid, oils, carbon disulfide, dilute solutions of fixed alkali hydroxides. Low toxicity. Hard and friable at room temperature; soft and very sticky when warm. Combustible.
Chief constituents: Resin acids of the abietic and pimaric types, having the general formula $C_{19}H_{29}COOH$, and having a phenanthrene nucleus. See also turpentine.
Derivation: From pine trees, chiefly Pinus palustris and Pinus caribaea. (a) Gum rosin is the residue obtained after the distillation of turpentine oil from the oleoresin tapped from living trees. (b) Wood rosin is obtained by extracting pine stumps with naphtha and distilling off the volatile fraction. (c) Tall oil rosin is a byproduct of the fractionation of tall oil (q.v.).
Grades: Virgin; yellow dip; hard; N.F. Wood rosin is grades B, C, D, E, F, FF, G, H, I, J, K, L, M, N, W-G (window-glass), W-W (water-white). The grading is done by color, B being the darkest and W-W the lightest.
Containers: Drums; multi-wall paper bags.
Uses: Hot-melt and pressure-sensitive adhesives; mastics and sealants; varnishes; ester gum; soldering compounds; core oils; insulating compounds; soaps; paper sizing, printing inks; polyesters (formed by reaction of the conjugated acids of rosin with acrylic acid, followed by reaction with a glycol). See also abietic acid.

rosin oil.
Properties: Water-white to brown liquid; viscous; odorless; strong, peculiar taste. Soluble in ether, chloroform, fatty oils and carbon disulfide; slightly soluble in alcohol; insoluble in water. Essentially decarboxylated rosin acids. Sp. gr. 0.980–1.110; iodine number 112–115.
Derivation: By fractional distillation of rosin, that portion distilling above 360°C being rosin oil.
Containers: Drums; tank cars.
Hazard: Spontaneous heating; fire risk when heated.

Uses: Lubricant; ad
hot-melt adhesives;
per for wrapping ele

rosin soap. See sodiur

"Roskydal."[470] Trader
polyesters curing w
cations.

rosolic acid. See aurin

"Rotalin."[20] Tradema
printing colors.
Uses: Principally in tl
types of paper and c

"Rotax."[256] Trademarl
captobenzothiazole.
Use: Primary accelera

rotenone (tubatoxin) (
pound.
Properties: White, od
alcohol, acetone, and
ble in water. Not co
1.27 at 20°C; m.p. 1
solution, specific rot
zene, 62° in ethylene
Grades: C. P. crystals
derris and cube root.
Containers: Fiber drun
Hazard: Moderately t
meter of air.
Uses: Insecticide (tox
sprays; mothproofing

"Rotoclor."[56] Tradema
with other additives
vure work. Contains
carboys.

rouge. (1) A high-grac
ishing agent for gla
oxide red.
(2) A cosmetic pre
safflower.

"Rovana."[303] Tradema
dene chloride copoly
folded flat tape, offer

Roxel process. A proc
sistance of cotton by
i.e., by applying a fo
(hydroxymethyl)phos
(q.v.), triethylolamine
These substances cro
of the cellulose (q.v.)
ble protective mediu
manufacture of blan
dustrial safety garmer

"Roylac."[240] Trademar
elastomers (q.v.).

"Royalene."[240] Tradem
formance ethylene-pr
Properties: Resistance
light aging, steam a
temperatures, excelle
be easily colored.
Uses: Tires, automoti
insulation.

Superior number